Answers to Diabetes: Part 2
Type 1 Diabetes

Dr. Bryan Ardis D.C.

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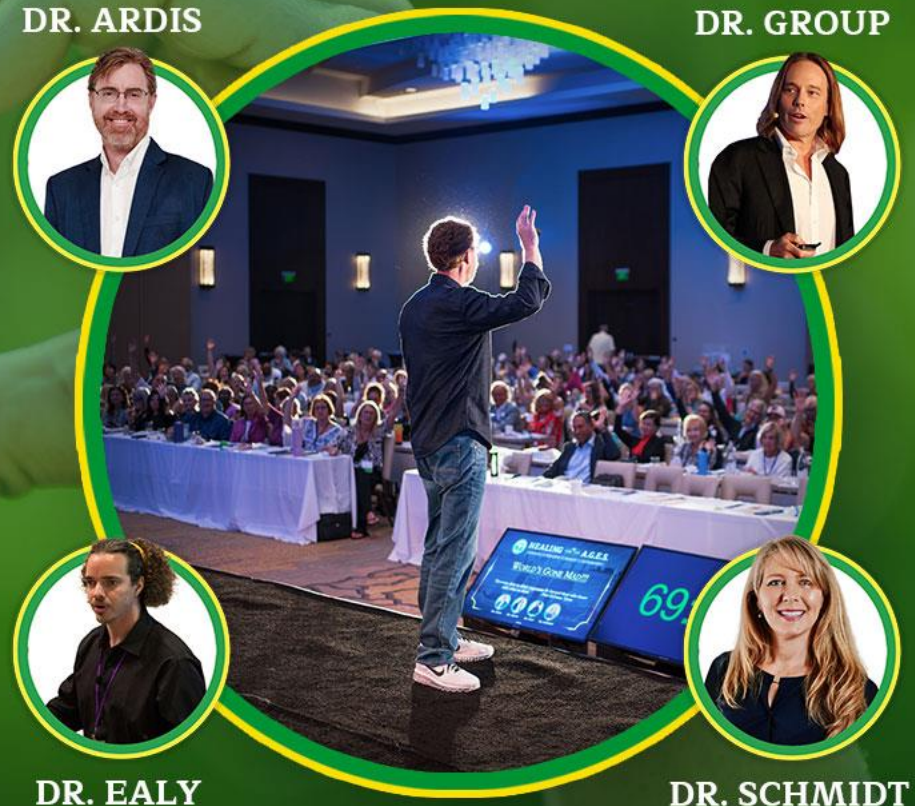

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Home / Health Library / Diseases & Conditions / Type 1 Diabetes

Type 1 Diabetes

Type 1 diabetes is a chronic (life-long) autoimmune disease that prevents your pancreas from making insulin. It requires daily management with insulin injections and blood sugar monitoring. Both children and adults can be diagnosed with Type 1 diabetes.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

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If you don't have enough insulin, too much sugar builds up in your blood, causing hyperglycemia (high blood sugar), and your body can't use the food you eat for energy. This can lead to serious health problems or even death if it's not treated. People with Type 1 diabetes need synthetic insulin every day in order to live and be healthy.

Type 1 diabetes was previously known as juvenile diabetes and insulin-dependent diabetes.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

Who does Type 1 diabetes affect?

Anyone at any age can develop Type 1 diabetes (T1D), though the most common age at diagnosis is between the ages of 4 to 6 and in early puberty (10 to 14 years).

In the United States, people who are non-Hispanic white are most likely to get Type 1 diabetes, and it affects females and males almost equally.

How common is Type 1 diabetes?

Type 1 diabetes is relatively common. In the United States, approximately 1.24 million people live with Type 1 diabetes, and that number is expected to grow to five million by 2050.

Type 1 diabetes is one of the most common chronic diseases that affect children in the United States, though adults can be diagnosed with the disease as well.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

Symptoms of Type 1 diabetes in adults and children

Excessive thirst

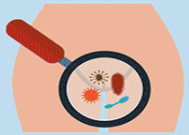
Excessive hunger

Unexplained weight loss

Blurred vision

Slow healing of cuts and sores

Fatigue



Vaginal yeast infections

Frequent urination, including frequent full diapers in infants and bedwetting in children

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

How is Type 1 diabetes treated?

People with Type 1 diabetes need synthetic insulin every day, multiple times a day in order to live and be healthy. They also need to try to keep their blood sugar within a healthy range.

Since several factors affect your blood sugar level, Type 1 diabetes management is complex and highly individualized.

Three of the main components of Type 1 diabetes management include:

- Insulin.
- Blood glucose (sugar) monitoring.
- Carbohydrate counting.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

You can take insulin in the following ways:

- **Multiple daily injections (MDI):** Injectable insulin uses a vial and syringe. With each injection, you use a syringe to get the correct dose of insulin out of the vial. You can inject the insulin into the fatty tissue of your belly, upper arm, thigh or buttocks. Injections are usually the least expensive way to take insulin.
- **Pen:** Insulin pens are similar to injections, but the pen is pre-filled with insulin. The disposable pen needles are usually more convenient than syringes. They can also be a good option for people with low vision.
- **Pump:** Insulin pumps are devices that deliver insulin continuously and on demand. They mimic the way your pancreas would naturally release insulin. Pumps deliver insulin through a tiny catheter (thin, flexible tube) that goes in your belly or another fleshy area of your body.
- **Rapid-acting inhaled insulin**: This type of insulin (known as Afrezza®) is inhaled through your mouth (much like an asthma inhaler). It works much quicker than other types of insulin.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes

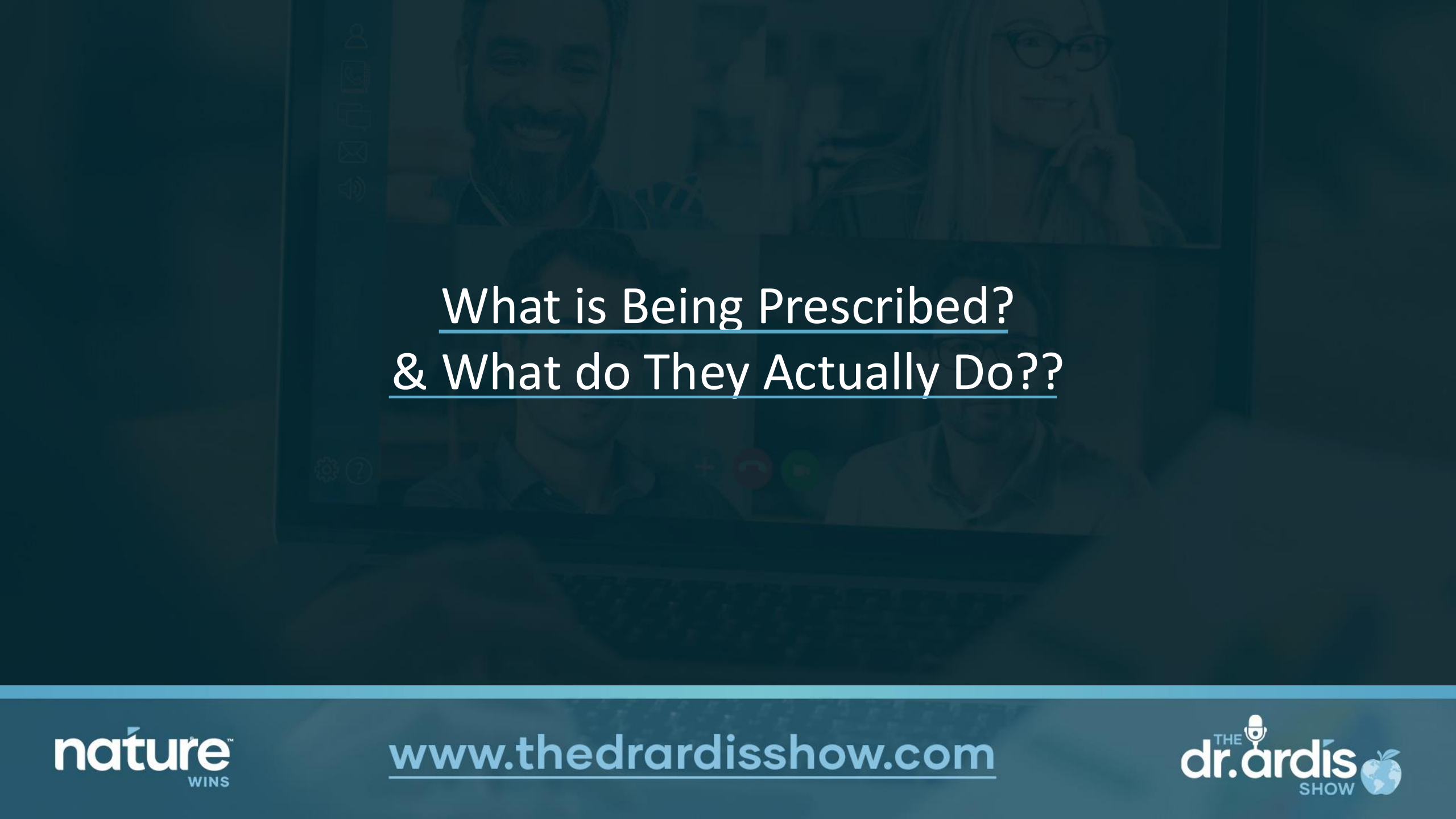
Is there a cure for Type 1 diabetes?

There is currently no cure for Type 1 diabetes, but scientists are working on ways to prevent or slow down the progression of the condition through studies such as TrialNet.

Scientists are also working on research into pancreatic islet transplantation — an experimental treatment for people who have brittle diabetes.

Pancreatic islets are clusters of cells in the pancreas that make insulin. Your immune system attacks these cells in Type 1 diabetes. A pancreatic islet transplant replaces destroyed islets with new ones that make and release insulin. This procedure takes islets from the pancreas of an organ donor and transfers them to a person with Type 1 diabetes. Because researchers are still studying pancreatic islet transplantation, the procedure is only available to people enrolled in a study.

https://my.clevelandclinic.org/health/diseases/21500-type-1-diabetes


What is Being Prescribed?
& What do They Actually Do??

Home > Levemir

Levemir

Generic name: insulin detemir [*IN-su-lin-DE-te-mir*]
Other brand names of insulin detemir include: Levemir, Levemir FlexTouch
Drug class: Insulin

Medically reviewed by Melisa Puckey, BPharm. Last updated on March 1, 2024.

Uses | Warnings | Before taking | Dosage | Side effects | Interactions | FAQ

What is Levemir?

Levemir is a man-made form of insulin, a hormone that is produced in the body. Insulin works by lowering levels of glucose (sugar) in the blood.

Levemir is a long-acting insulin that starts to work several hours after injection and keeps working evenly for up to 24 hours.

Levemir is used to improve blood sugar control in people with diabetes mellitus. This medicine is for use in adults and children at least 2 years old.

https://www.drugs.com/levemir.html

Levemir Side Effects

Generic name: *insulin detemir*

Medically reviewed by Drugs.com. Last updated on Nov 25, 2024.

Serious side effects | Other side effects | Professional info | FAQ

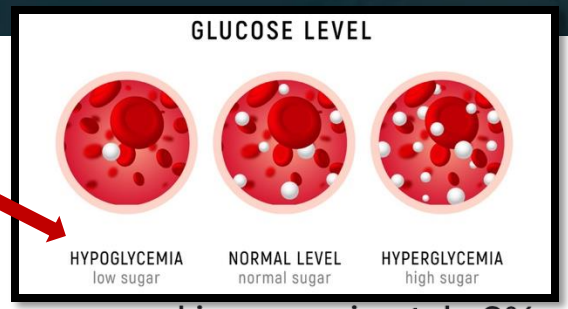
Note: This document provides detailed information about **Levemir** Side Effects associated with *insulin detemir*. Some dosage forms listed on this page may not apply specifically to the brand name **Levemir**.

Applies to insulin detemir: **subcutaneous solution**.

https://www.drugs.com/levemir.html

Metabolic

- **Very common** (10% or more): Hypoglycemia
- **Frequency not reported**: Weight gain[Ref]

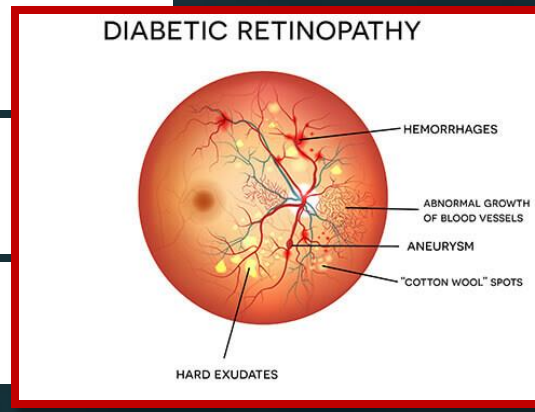


Severe hypoglycemia defined as third party intervention, occurred in approximately 6% of patients receiving insulin detemir (the active ingredient contained in Levemir) in clinical trials. Weight gain has been reported with insulin therapy and has been attributed to the anabolic effects of insulin and the decrease in glucosuria.[Ref]

Ocular

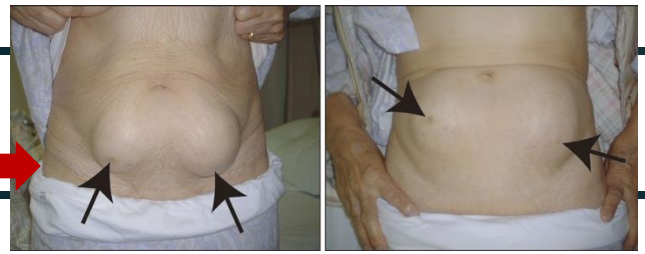
- **Frequency not reported**: Refraction disorder, worsening of diabetic retinopathy[Ref]

Rapid improvement in glucose control has been associated with a transitory, reversible ophthalmologic refraction disorder and worsening of diabetic retinopathy. However, long-term glycemic control decreases the risk of diabetic retinopathy.[Ref]



Dermatologic

- **Common** (1% to 10%): Lipohypertrophy



Genitourinary

- **Common** (1% to 10%): Urinary tract infection[Ref]

https://www.drugs.com/levemir.html

Immunologic

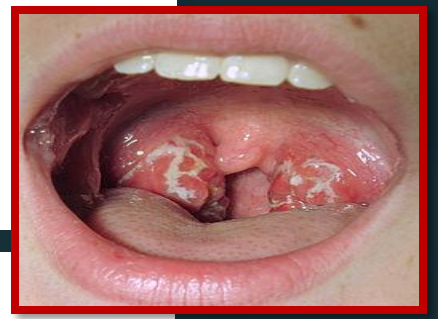
- **Very common** (10% or more): Influenza-like illness (up to 13%)
- **Common** (1% to 10%): Viral infection
- **Frequency not reported**: Antibody development[Ref]

Gastrointestinal

- **Very common** (10% or more): Gastroenteritis (up to 16%), abdominal pain (up to 13%)
- **Common** (1% to 10%): Nausea, vomiting, toothache[Ref]

Nervous system

- **Very common** (10% or more): Headache (up to 31%)
- **Common** (1% to 10%): Migraine, dizziness



Respiratory

- **Very common** (10% or more): Upper respiratory tract infection (up to 35%), pharyngitis (up to 17%)
- **Common** (1% to 10%): Bronchitis, cough, rhinitis, sinusitis[Ref]

https://www.drugs.com/levemir.html

Home > Afrezza

Afrezza

Generic name: insulin human
Dosage form: inhalation powder
Drug class: Insulin

Medically reviewed by Judith Stewart, BPharm. Last updated on Sep 27, 2024.

Uses | Warnings | Before taking | Interactions | Dosage | Side effects

What is Afrezza?

- Afrezza is a man-made insulin that is breathed-in through your lungs (inhaled) and is used to control high blood sugar in adults with diabetes mellitus.
- Afrezza is not for use in place of long-acting insulin. Afrezza must be used with long-acting insulin in people who have type 1 diabetes mellitus.

https://www.drugs.com/afrezza.html

Home > Afrezza

Print Save

Afrezza

Important warnings

This medicine can cause some serious health issues

Inhalation route (aerosol powder)

Acute bronchospasm has been observed in patients with asthma and COPD using insulin, human inhaled.

Insulin, human inhaled, is contraindicated in patients with chronic lung disease such as asthma or COPD.

Before initiating insulin, human inhaled, perform a detailed medical history, physical examination, and spirometry (FEV1) to identify potential lung disease in all patients.

https://www.drugs.com/afrezza.html

Afrezza side effects

Afrezza may cause serious side effects that can lead to death, including:

See Important information

- **Low blood sugar (hypoglycemia).** Signs and symptoms that may indicate low blood sugar include:
  - dizziness or light-headedness, sweating, confusion, headache, blurred vision, slurred speech, shakiness, fast heartbeat, anxiety, irritability or mood change, hunger.
- **Decreased lung function.** Your healthcare provider should check how your lungs are working before you start using Afrezza, 6 months after you start using it and yearly after that.
- **Lung cancer.** In studies in people with diabetes, lung cancer occurred in a few more people who were taking Afrezza than in people who were taking other diabetes medications. There were too few cases to know if lung cancer was related to Afrezza. If you have lung cancer, you and your healthcare provider should decide if you should use this medicine.
- **Diabetic ketoacidosis.** Talk to your healthcare provider if you have an illness. Your Afrezza dose or how often you check your blood sugar may need to be changed.

https://www.drugs.com/afrezza.html

Afrezza side effects

Afrezza may cause serious side effects that can lead to death, including:

See Important information

- **Severe allergic reaction (whole body reaction).** Get medical help right away if you have any of these signs or symptoms of a severe allergic reaction:
  - A rash over your whole body, trouble breathing, a fast heartbeat, or sweating.
- **Low potassium in your blood (hypokalemia).**
- **Heart failure.** Taking certain diabetes pills called thiazolidinediones or "TZDs" with Afrezza may cause heart failure in some people. This can happen even if you have never had heart failure or heart problems before. If you already have heart failure it may get worse while you take TZDs with Afrezza. Your healthcare provider should monitor you closely while you are taking TZDs with this medicine. Tell your healthcare provider if you have any new or worse symptoms of heart failure including:
  - Shortness of breath, swelling of your ankles or feet, sudden weight gain.

  Treatment with TZDs and Afrezza may need to be changed or stopped by your healthcare provider if you have new or worse heart failure.

https://www.drugs.com/afrezza.html

This label may not be the latest approved by FDA.
For current labeling information, please visit https://www.fda.gov/drugsatfda

HIGHLIGHTS OF PRESCRIBING INFORMATION

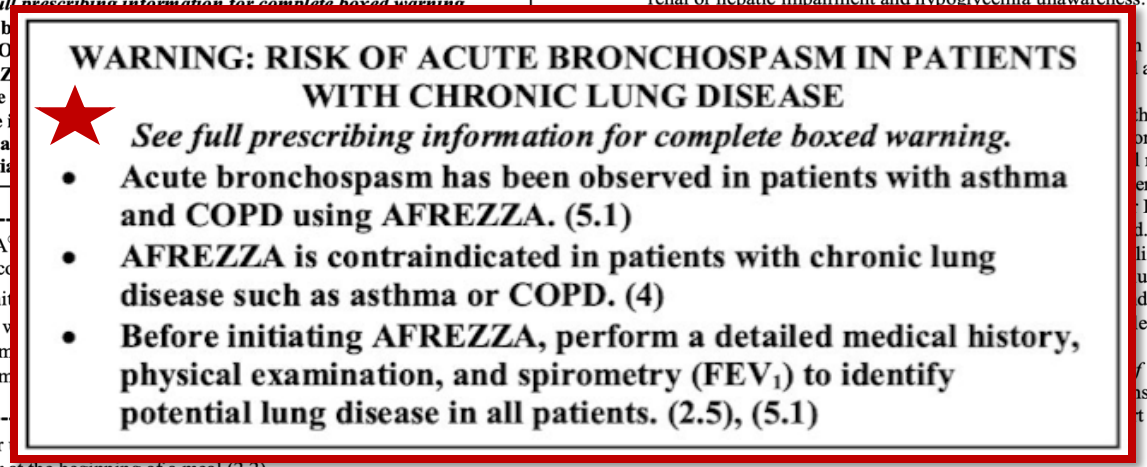
These highlights do not include all of the information needed to use AFREZZA® safely and effectively. See full prescribing information for AFREZZA.

AFREZZA® (insulin human) Inhalation Powder
Initial U.S. Approval: 2014

WARNING: RISK OF ACUTE BRONCHOSPASM IN PATIENTS WITH CHRONIC LUNG DISEASE

See full prescribing information for complete boxed warning.

- **Acute b… and CO…**
- **AFREZ… disease**
- **Before i… physica… potentia…**



- AFREZZA… glycemic co…

Important limit…

- In patients w…
- Not recomm…
- Not recomm…

- Administer …
- Administer at the beginning of a meal (2.2)
- Dosing must be individualized (2.2)
- Before initiating, perform a detailed medical history, physical examination, and spirometry (FEV_1) in all patients to identify potential lung disease (2.5)

----------DOSAGE FORMS AND STRENGTHS ----------

AFREZZA is available as single-use cartridges of: (3)

- 4 units
- 8 units

---------- CONTRAINDICATIONS ----------

- During episodes of hypoglycemia (4)
- Chronic lung disease, such as asthma, or chronic obstructive pulmonary disease (4)

---------- WARNINGS AND PRECAUTIONS ----------

- *Acute Bronchospasm*: Acute bronchospasm has been observed in patients with asthma and COPD. Before initiating, perform spirometry (FEV_1) in all patients. Do not use in patients with chronic lung disease (2.5, 4, 5.1)
- *Change in Insulin Regimen*: Carry out under close medical supervision and increase frequency of blood glucose monitoring. (5.2)
- *Hypoglycemia*: May be life-threatening. Increase frequency of glucose monitoring with changes to: insulin dosage, co-administered glucose lowering medications, meal pattern, physical activity; and in patients with renal or hepatic impairment and hypoglycemia unawareness.

…(e.g., …annually, even

…h active lung …or lung cancer, …risk. (5.5)
…erienced … DKA, monitor …d. (5.6)
…lized allergy, …uding …dicated. (5.7)
…evels in patients

…s of heart …t failure occurs.

---------- ADVERSE REACTIONS ----------

The most common adverse reactions associated with AFREZZA (2% or greater incidence) are hypoglycemia, cough, and throat pain or irritation (6)

To report SUSPECTED ADVERSE REACTIONS, contact MannKind Corporation at (1-877-323-8505) or FDA at (1-800-FDA-1088) or www.fda.gov/medwatch.

---------- DRUG INTERACTIONS ----------

Drugs that Affect Glucose Metabolism: Adjustment of insulin dosage may be needed. (7.1, 7.2, 7.3)
Anti-Adrenergic Drugs (e.g., beta-blockers, clonidine, guanethidine, and reserpine): Signs and symptoms of hypoglycemia may be reduced or absent. (7.3, 7.4)

https://www.accessdata.fda.gov/drugsatfda_docs/label/2014/022472lbl.pdf

---------- WARNINGS AND PRECAUTIONS ----------

- *Acute Bronchospasm*: Acute bronchospasm has been observed in patients with asthma and COPD. Before initiating, perform spirometry (FEV_1) in all patients. Do not use in patients with chronic lung disease (2.5, 4, 5.1)
- *Change in Insulin Regimen*: Carry out under close medical supervision and increase frequency of blood glucose monitoring. (5.2)
- *Hypoglycemia*: May be life-threatening. Increase frequency of glucose monitoring with changes to: insulin dosage, co-administered glucose lowering medications, meal pattern, physical activity; and in patients with renal or hepatic impairment and hypoglycemia unawareness. (5.3,6,7,8.5,8.6)
- *Decline in Pulmonary Function*: Assess pulmonary function (e.g., spirometry) before initiating, after 6 months of therapy, and annually, even in the absence of pulmonary symptoms. (2.5, 5.4)
- *Lung Cancer*: AFREZZA should not be used in patients with active lung cancer. In patients with a history of lung cancer or at risk for lung cancer, the benefit of AFREZZA use should outweigh this potential risk. (5.5)
- *Diabetic Ketoacidosis*: More patients using AFREZZA experienced diabetic ketoacidosis in clinical trials. In patients at risk for DKA, monitor and change to alternate route of insulin delivery, if indicated. (5.6)
- *Hypersensitivity Reactions*: Severe, life-threatening, generalized allergy, including anaphylaxis, can occur with insulin products, including AFREZZA. Discontinue AFREZZA, monitor and treat if indicated. (5.7)
- *Hypokalemia*: May be life-threatening. Monitor potassium levels in patients at risk of hypokalemia and treat if indicated. (5.8)
- *Fluid Retention and Heart Failure with Concomitant Use of Thiazolidinediones (TZDs):* Observe for signs and symptoms of heart failure; consider dosage reduction or discontinuation if heart failure occurs.

https://www.accessdata.fda.gov/drugsatfda_docs/label/2014/022472lbl.pdf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Medicine (Baltimore). 2017 Mar 24;96(11):e6352. doi: 10.1097/MD.0000000000006352

Oral magnesium supplementation improves glycemic control and lipid profile in children with type 1 diabetes and hypomagnesaemia

Doaaa Shahbah [a], Tamer Hassan [a,*], Saeed Morsy [a], Hosam El Saadany [a], Manar Fathy [a], Ashgan Al-Ghobashy [a], Nahla Elsamad [a], Ahmed Emam [a], Ahmed Elhewala [a], Boshra Ibrahim [a], Sherief El Gebaly [a], Hany El Sayed [a], Hanan Ahmed [b]

Editor: Girish Chandra Bhatt

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PMCID: PMC5369924 PMID: 28296769

afrezza-inhaler-1.svghttps://pmc.ncbi.nlm.nih.gov/articles/PMC5369924/

We aimed to evaluate the status of serum Mg in children with type 1 diabetes and assessing its relationship to glycemic control and lipid profile. Then evaluating the effect of oral Mg supplementation on glycemic control and lipid parameters.

We included 71 children at Pediatric Endocrinology Outpatient Clinic, Zagazig University, Egypt with type 1 diabetes and assessed HBA1c, lipid profile, and serum Mg at the start of study. Patients with serum Mg level < 1.7 mg/dL were given 300 mg Mg oxide for 3 months. After that we reevaluated HBA1c, lipid profile, and serum Mg in all patients.

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Our study showed that there was statistically significant difference in serum Mg level before and after Mg supplementation being higher after Mg supplementation with mean ± SD of Mg was 1.45 ± 0.15 mg/dL before Mg supplementation versus 1.94 ± 0.12 mg/dL after Mg supplementation ($P < 0.001$). This is in agreement with Djurhuus et al[29] who revealed increase in serum Mg level with Mg supplementation (500 mg twice daily of MgO) for 24 weeks in adult patients with type 1 diabetes. Also concordant with our results Rodriguez-Moran and Guerrero-Romero[11] in type 2 diabetic adults revealed that there is a significant increase in serum Mg after a period of oral Mg supplementation. However, it is inconsistent with Solati et al[30] who failed to show a significant difference in serum Mg before and after Mg supplementation.

afrezza-inhaler-1.svghttps://pmc.ncbi.nlm.nih.gov/articles/PMC5369924/

Our study showed that there was a significant difference between HbA1c before and after Mg supplementation as mean value of HbA1c before supplementation was $10.11\% \pm 0.87\%$ versus $7.88\% \pm 0.42\%$ after oral supplementation ($P < 0.001$). This indicates that oral Mg level may have a good role on glycemic control of type 1 diabetes. This result is concordant with Rodriguez-Moran and Guerrero-Romero[11] who followed adult type 2 diabetic patients before and after Mg chloride supplementation and showed significant reduction of fasting blood glucose and HbA1c with oral Mg. Moreover, Solati et al[30] showed that oral Mg improves both fasting blood glucose and postprandial blood glucose, but not HbA1c. This double-blind controlled trial was done on adult patients with type 2 diabetes. They used Mg supplement as 300 mg of $MgSO_4$ per day. Evidence from epidemiologic studies demonstrated an association between Mg-rich diet and decreased incidence of T1DM and its complications.

afrezza-inhaler-1.svghttps://pmc.ncbi.nlm.nih.gov/articles/PMC5369924/

[31] Dong et al[32] meta-analysis provides further evidence supporting that Mg intake is significantly inversely associated with risk of type 2 diabetes in a dose–response manner. Lopez-Ridaura et al[33] also showed that Mg supplementation decreases the risk of type 2 diabetes in adult population. Indeed, Sales and Pedrosa Lde[34] observed that inadequate metabolic control can affect the corporal concentrations of Mg, developing hypomagnesemia, which may be still directly related with some micro- and macrovascular complications observed in diabetes, as cardiovascular disease, retinopathy, and neuropathy. Based on this, the supplementation with Mg has been suggested in patients with diabetes mellitus who have proven hypomagnesemia and the presence of its complications.

afrezza-inhaler-1.svghttps://pmc.ncbi.nlm.nih.gov/articles/PMC5369924/

In our study, we detected a significant difference in lipid parameters before and after oral Mg supplementation in hypomagnesemic diabetic children with lower value of TC, TG, and LDL after supplementation and higher HDL after supplementation ($P < 0.001$). This is in agreement with Djurhuus et al[29] that observed decreased atherogenic lipid fractions (total cholesterol, LDL, and Apo lipoprotein B), with Mg supplementation in type 1 diabetes and reduced the risk of cardiovascular complications. Also Lal et al[36] observed a significant fall in serum total cholesterol, LDL, and triglycerides and a rise in HDL 4 to 8 weeks after Mg supplementation. Consistent with our study also Solati et al[30] showed a significant reduction in LDL in Mg-treated diabetic patients.

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5. Conclusion

Our study demonstrates that serum total Mg is frequently low in Egyptian children with type 1 diabetes, and it is correlated with glycemic control and lipid profile. Also we concluded that correction of hypomagnesemia in type 1 diabetic children with oral Mg supplements is associated with optimization of glycemic control and reduction of atherogenic lipid fraction as well as increase in protective lipid fraction.

afrezza-inhaler-1.svghttps://pmc.ncbi.nlm.nih.gov/articles/PMC5369924/

Nutrition
Volume 38, June 2017, Pages 54-60

Review

Effect of magnesium supplementation on insulin resistance in humans: A systematic review

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https://doi.org/10.1016/j.nut.2017.01.009

https://www.sciencedirect.com/science/article/pii/S0899900717300229

Effect of magnesium supplementation on IR in humans

The results of eight clinical trials demonstrated that magnesium supplementation reduced fasting serum glucose, with two trials showing improvement in oral glucose tolerance, and five verifying reduction of fasting insulin. As for HbA1c, only one study showed improvement in this parameter. The results of seven studies showed a reduction in HOMA-IR after supplementation with the mineral, and only one study demonstrated improvement in HOMA-β levels, QUICKI, and ISI-Matsuda. There was no effect on the ISI-Gutt parameter, rated by only one study.

Rodriguez-Moran and Guerrero-Romero [12] found a significant reduction in HOMA-IR, fasting insulin, HbA1c, and blood sugar after supplementation with 50 mL of 5% magnesium chloride (equivalent to 300 mg of elemental magnesium) for 16 wk in patients with T2DM.

https://www.sciencedirect.com/science/article/pii/S0899900717300229

Guerrero-Romero et al. [13] also examined the effect of supplementation with 50 mL/d magnesium chloride at 5% (equivalent to 300 mg of elemental magnesium) in healthy adult men and women for 12 wk, and observed a reduction in serum concentrations of glucose, insulin, and values of HOMA-IR, demonstrating a beneficial effect of the intervention in improving IR in these individuals. Associated with this, Rodriguez-Moran and Guerrero-Romero [16] supplemented men and women metabolically obese and with normal weight to 30 mL/d of magnesium chloride at 5% (equivalent to 382 mg of elemental magnesium) for 16 wk and observed reduction in serum concentrations of fasting and postprandial glucose and HOMA-IR values.

https://www.sciencedirect.com/science/article/pii/S0899900717300229

Mooren et al. [10] reported beneficial effects of an intervention with 15 nmol/d in the form of magnesium aspartate hydrochloride in overweight individuals, for 24 wk, pertaining to IR and sensitivity markers. A study conducted by Solati et al. [17] demonstrated that supplementation with 300 mg of elemental magnesium in the form of magnesium sulfide for 12 wk reduced fasting blood glucose of patients with T2DM, but had no effect on HbA1c, fasting insulin, or HOMA-IR. Guerrero-Romero et al. [9] also observed the effect of supplementation with 30 mL of 5% magnesium chloride (equivalent to 382 mg of elemental magnesium) for 16 wk on glucose and fasting IR in prediabetic individuals and hypomagnesemia, and observed that 29.4% of participants had improved glycemic control.

https://www.sciencedirect.com/science/article/pii/S0899900717300229

Asemi et al. [19] found a significant reduction in HOMA-IR, fasting insulin, fasting glucose, and HbA1c in women with gestational diabetes, after supplementation with 250 mg of magnesium oxide for 16 wk. Figure 3 shows the number of randomized controlled trials that evaluated the effect of magnesium supplementation on IR in humans.

https://www.sciencedirect.com/science/article/pii/S0899900717300229

Asemi et al. [19] found a significant reduction in HOMA-IR, fasting insulin, fasting glucose, and HbA1c in women with gestational diabetes, after supplementation with 250 mg of magnesium oxide for 16 wk. Figure 3 shows the number of randomized controlled trials that evaluated the effect of magnesium supplementation on IR in humans.

Conclusion

The results of this systematic review provide evidence of the benefits of magnesium supplementation on IR in patients with hypomagnesemia compared with those with normomagnesemia. However, new intervention studies are needed to elucidate the role of the nutrient as a protective factor against this metabolic disorder, as well as the standardization of the type, dose, and time of magnesium supplementation.

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Cureus
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Cureus. 2019 Dec 22;11(12):e6443. doi: 10.7759/cureus.6443

The Beneficiary Role of Selenium in Type II Diabetes: A Longitudinal Study

Dimitrios T Karalis [1,✉]

Editors: Alexander Muacevic, John R Adler

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PMCID: PMC6973540 PMID: 31998571

https://pmc.ncbi.nlm.nih.gov/articles/PMC6973540/

The study involves 94 individuals, 72 male and 22 female patients aged 48 to 64 years old with diabetes mellitus type 2. They did not present any diabetic complications or significant comorbidities. They were following a Mediterranean diet and were monitored in order to maintain a steady body mass index (BMI). They were administered with Se 200 µg, taken once daily on an empty stomach. The laboratory testing included fasting blood glucose, hemoglobin A1c (HbA1c), total cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL). The tests were performed before, three months after, and six months after the administration of selenium.

https://pmc.ncbi.nlm.nih.gov/articles/PMC6973540/

The study resulted in a statistically significant reduction in the blood levels of glucose, HbA1c, cholesterol, and LDL in both three months and six months after the beginning of the treatment. HDL did not present any change during the first three months but did present a statistically significant increase in six months. Triglycerides did not present a significant reduction in both three and six months.

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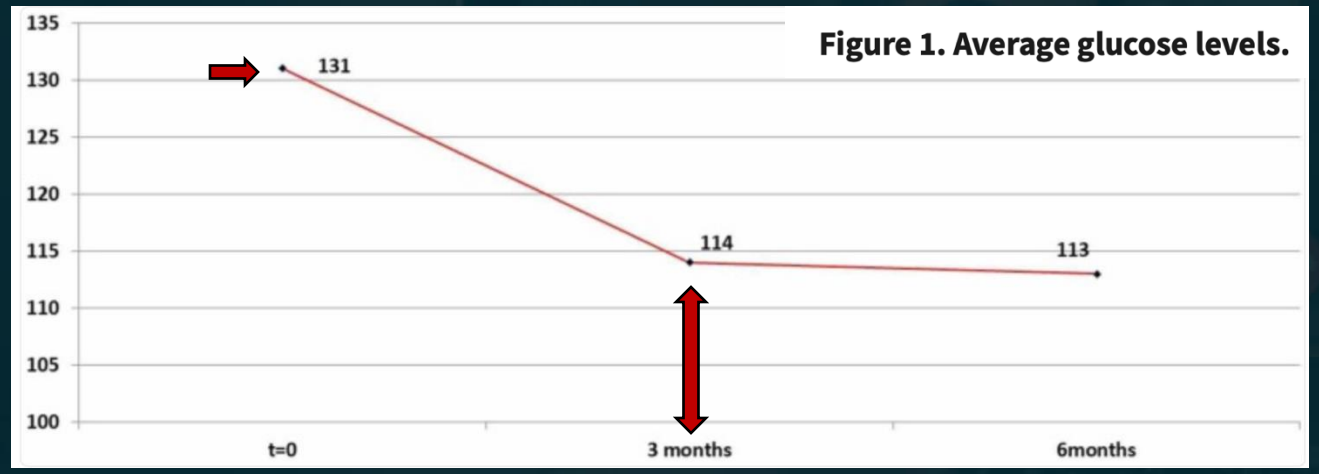

Figure 1. Average glucose levels.

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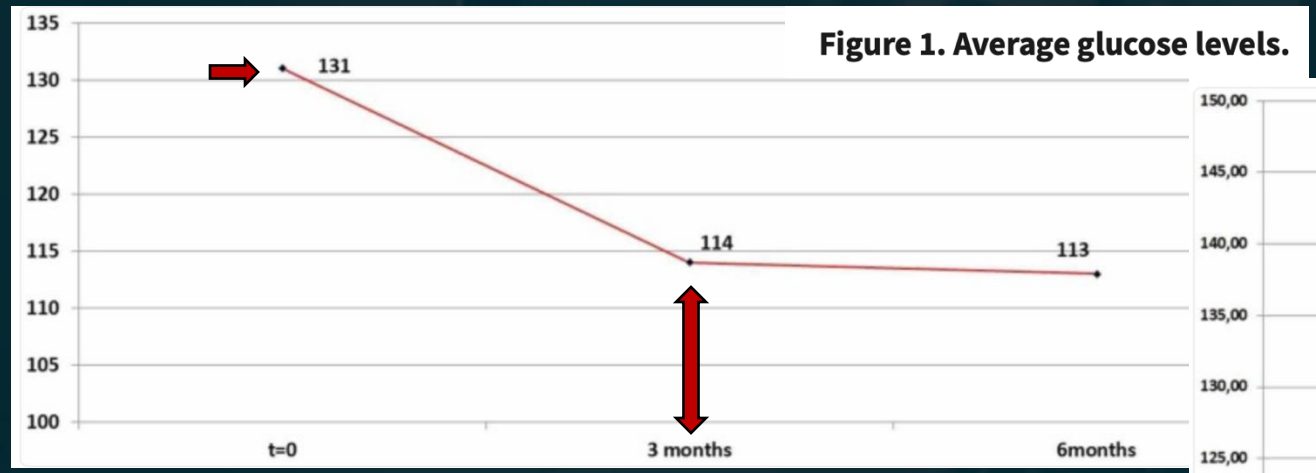

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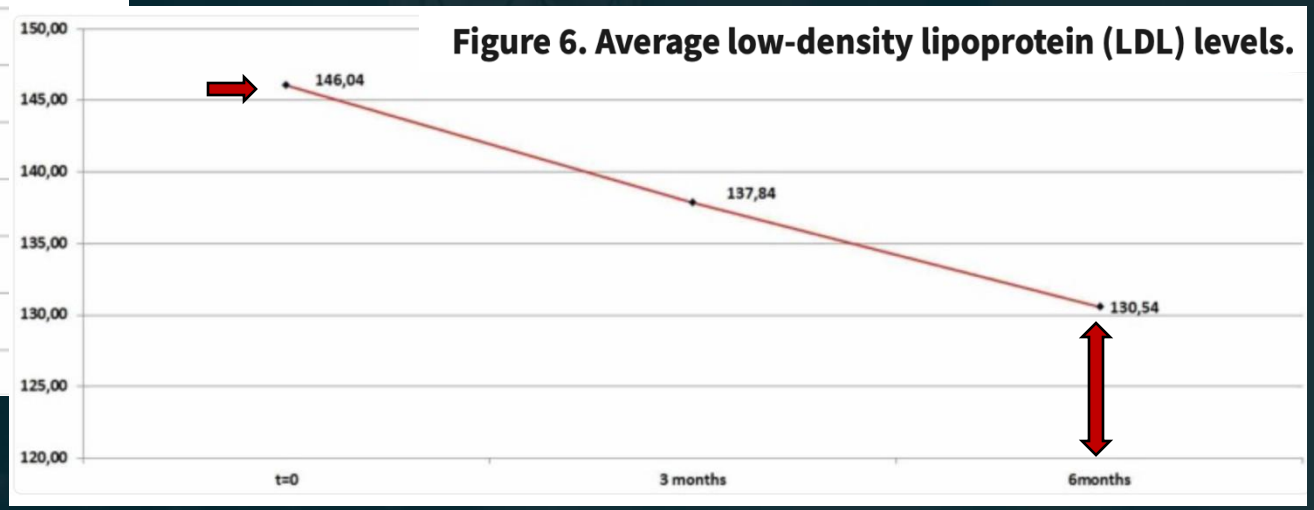

Figure 6. Average low-density lipoprotein (LDL) levels.

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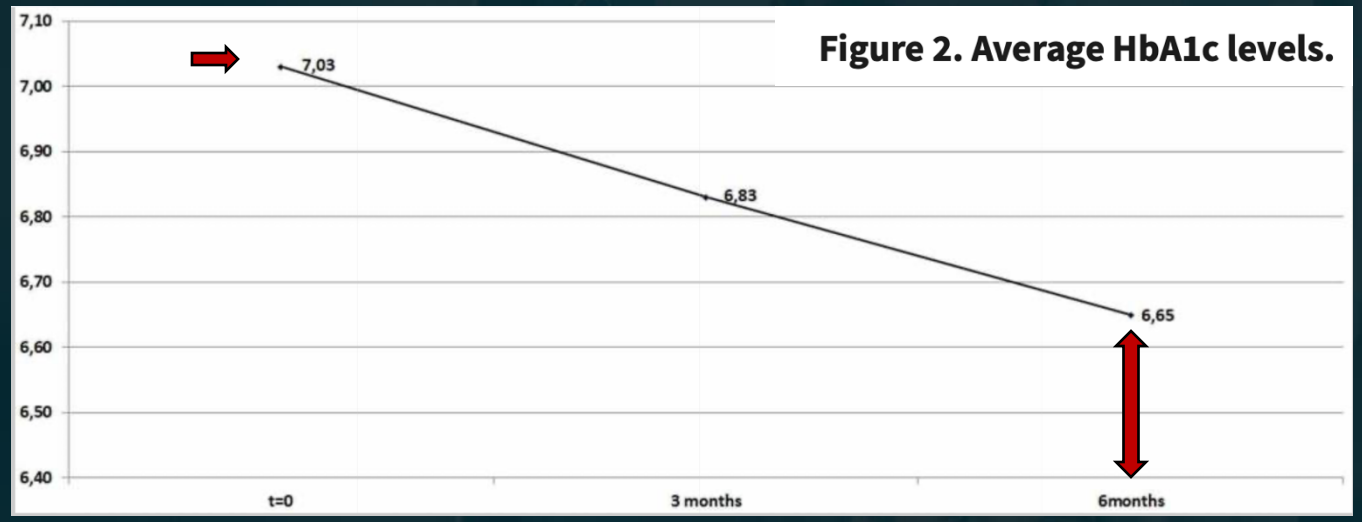

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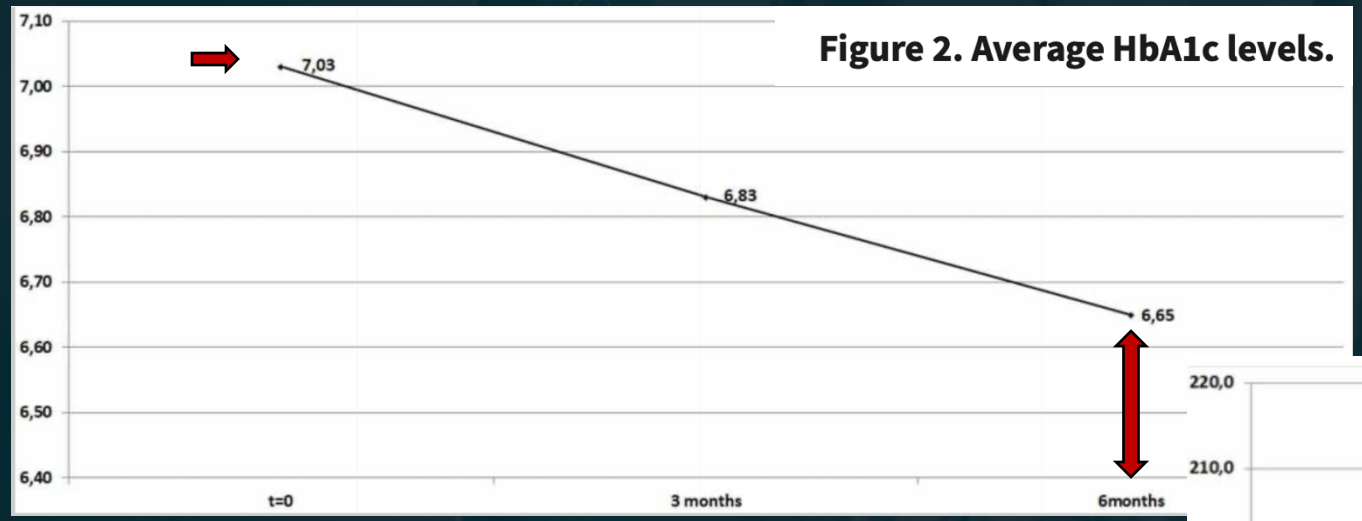

Figure 2. Average HbA1c levels.

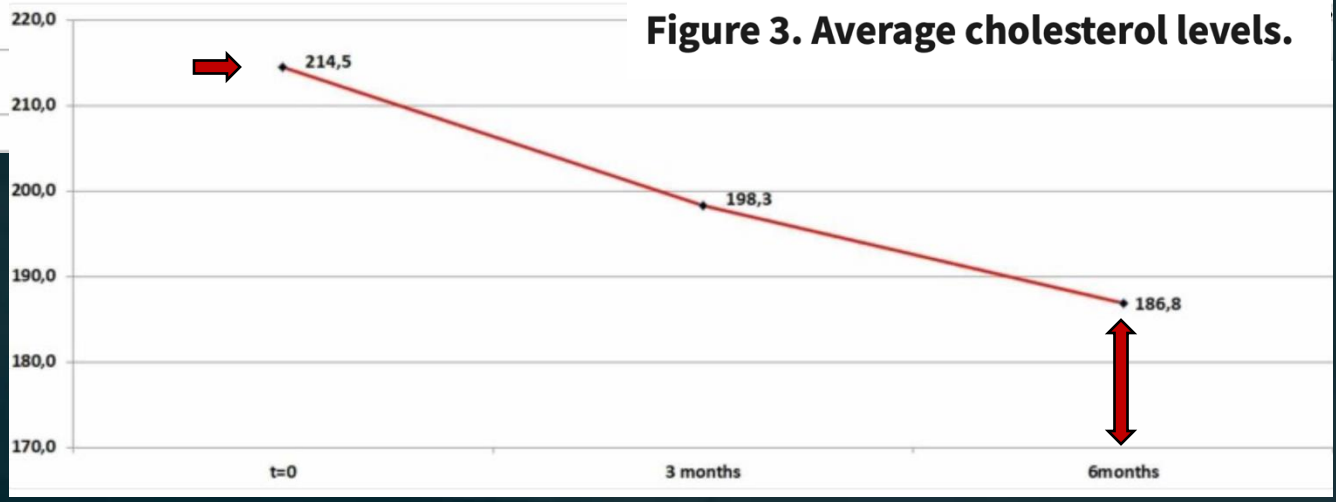

Figure 3. Average cholesterol levels.

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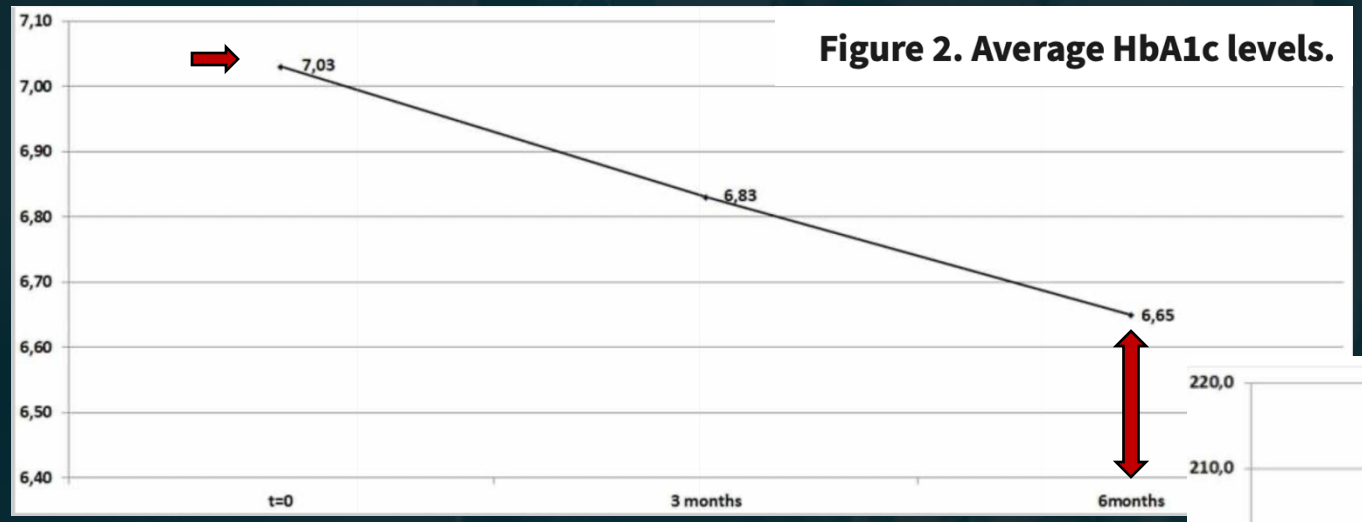

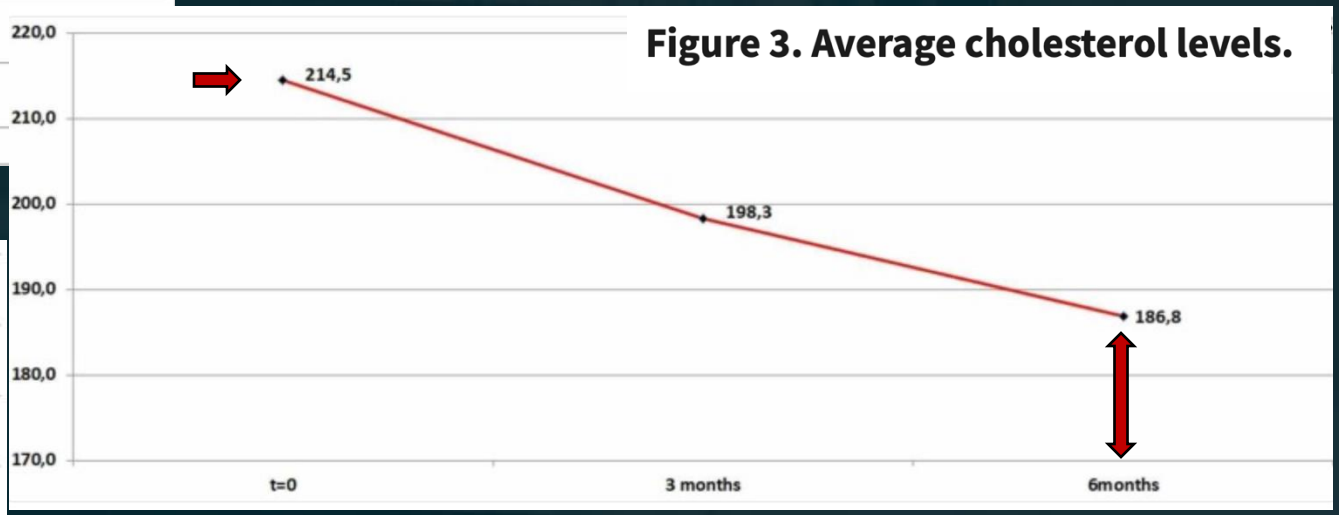

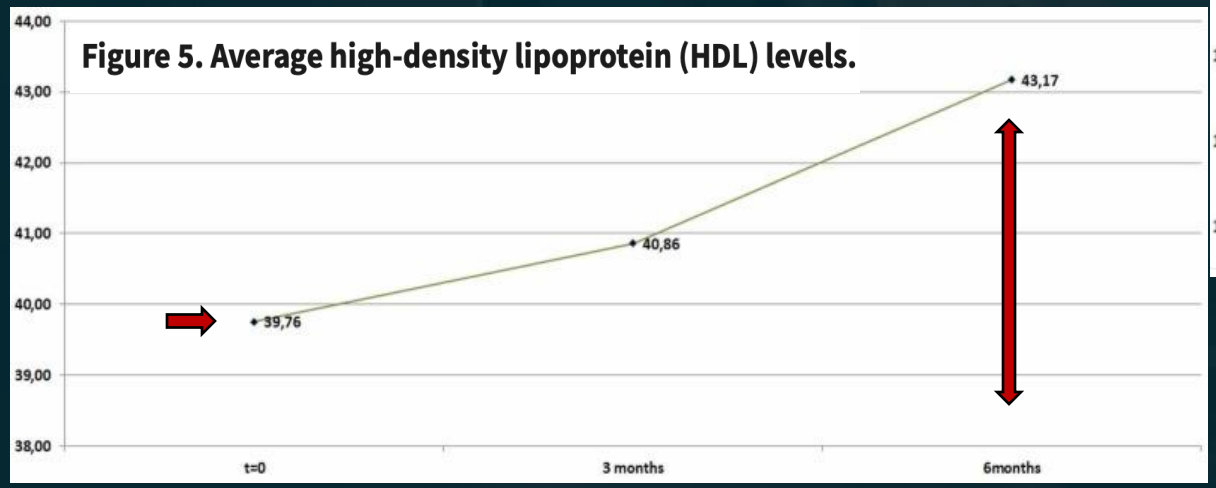

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Conclusions

The present study enforces the claims concerning the multiple benefits of Se as a dietary supplement in patients with type II diabetes under the prerequisite of following the Mediterranean diet as the recommended treatment method. Even though the present research is at an early stage, we could suggest that Se constitutes a necessary dietary supplement.

https://pmc.ncbi.nlm.nih.gov/articles/PMC6973540/

Pharmacological Research

Volume 195, September 2023, 106888

Selenium supplementation effect on glycemic control: A GRADE-assessed systematic review and dose-response meta-analysis of randomized controlled trials

Mahdi Vajdi [a 1], Shirin Hassanizadeh [a 1], Zeinab Gholami [a], Mohammad Bagherniya [b]

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A GRADE-assessed systematic review and dose-response meta-analysis

Main Outcomes

20 randomized controlled trials were included

Selenium supplementation

Reduction in fasting insulin

Increase in QUICKI levels

With 2995 participants

Not significant change in FBS , HbA1c, HOMA-IR

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4. Discussion

We investigated the association between selenium supplementation and glycemic control comprehensively in this systematic review and meta-analysis. In this study, selenium supplementation significantly improved insulin and QUICKI levels in comparison with control groups. In contrast, FBS, HOMA-IR, and HbA1c did not significantly change. Sensitivity analysis indicated that selenium supplementation could decrease FBS levels in the absence of Najib et al. Study [13]. Several factors may contribute to the observed results, such as different baseline selenium levels, dosage, and duration of the study. Our analysis also showed a significant decrease in FBS levels among participants who received 200 µg or less of selenium supplementation, had an intervention period of 12 weeks or less, were under 50, were men, and had diabetes, GDM, or prostate cancer. Additionally, the dose-response analysis revealed a non-linear relationship between selenium supplementation dosage and FBS. After the administration of 200 µg /day of selenium, the FBS reduction trend reversed.

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Consequently, it seems that 200 µg or less of selenium supplementation reduced FBS more effectively than administrating more than 200 µg. In regards to selenium supplementation and HOMA-IR, subgroup analysis showed that selenium supplementation significantly decreased HOMA-IR when trials lasted at least 12 weeks, participants were female, under 50 years of age, and had diabetes or GDM. Despite different subgroup analyses, selenium supplementation did not significantly decrease HbA1c. As changes in HbA1c are generally observed over time, this finding may be a result of an insufficient number of studies conducted longer than 12 weeks. In light of this, further research is warranted into the effect of selenium supplementation on long-term glycemic control. According to the subgroup analysis, selenium supplementation was most effective for diabetes and GDM patients. It has been found that diabetics may have a deficiency of selenium in comparison to non-diabetics [43]. Moreover, several

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previous studies have indicated that selenium levels in plasma and whole blood decrease during pregnancy due to fetal growth [13], [44]. A systematic review and meta-analysis study found that selenium supplementation reduced insulin levels and HOMA-IR and had no significant effect on FBS in patients with cardiometabolic diseases, which is similar to our findings [45]. The antioxidant properties of selenium may be attributed to the beneficial impact of selenium supplementation on glycemic indices. Glutathione peroxidase (GPX) is a subunit of Seleno proteins with antioxidant properties that reduces phospholipid hydroperoxide, hydrogen peroxide, and glucose [46], [47]. The increased antioxidant activity of GPX results in positive effects of selenium on pancreatic beta-cell mass and insulin synthesis [48]. In this vein, a meta-analysis study indicated that selenium supplementation decreased serum c-reactive protein (CRP) while increasing GPX levels, implying its beneficial effect on reducing inflammation and oxidative stress [49]. A review study also found that adequate selenium concentrations play an important role in insulin secretion and action, but an excess of selenium in the body is related to the pathogenesis of insulin resistance and the progression of diabetes mellitus [50].

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5. Conclusion

A significant reduction in insulin level and a significant increase in QUICKI score were observed after selenium supplementation in this meta-analysis. HOMA-IR and FBS were also improved by selenium supplementation among some subgroups of participants. In light of the close association between meta-analyses and evidence-based management practices in the clinic, in future clinical trials, different doses of selenium supplements, and baseline levels of serum selenium must be considered in order to gain a better understanding of the therapeutic effects of selenium supplements. It will also be necessary to conduct further prospective studies with larger sample sizes, from different countries, and longer follow-up periods in order to confirm whether selenium has effective anti-diabetic properties.

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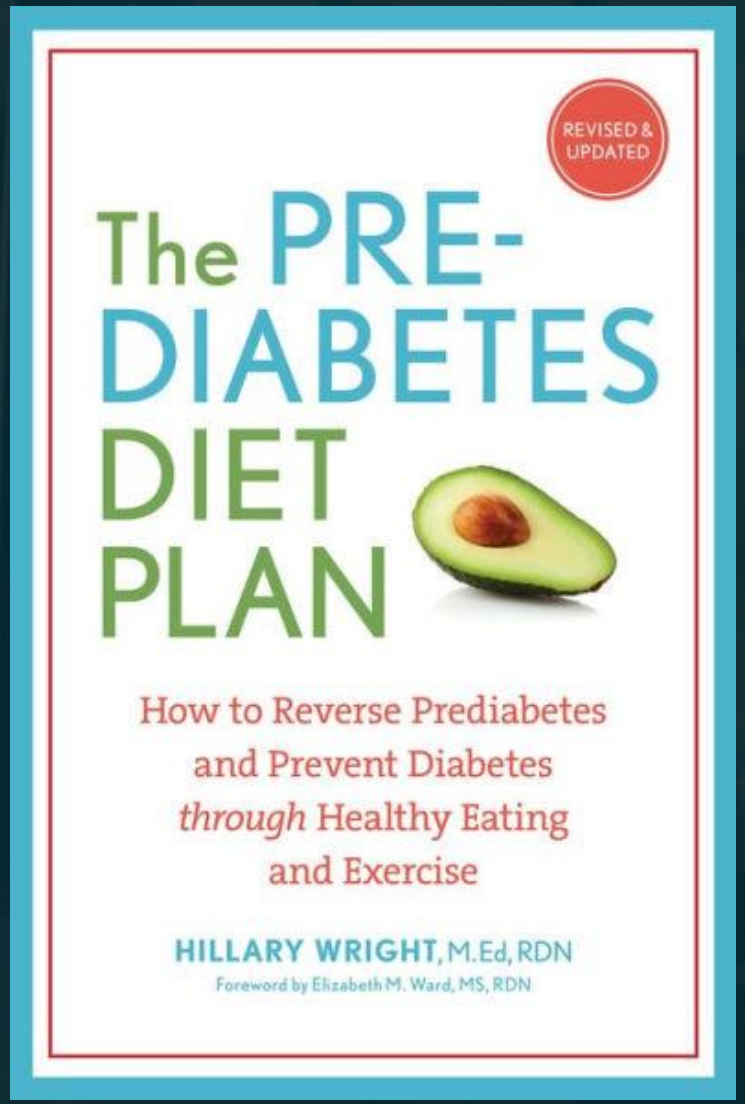

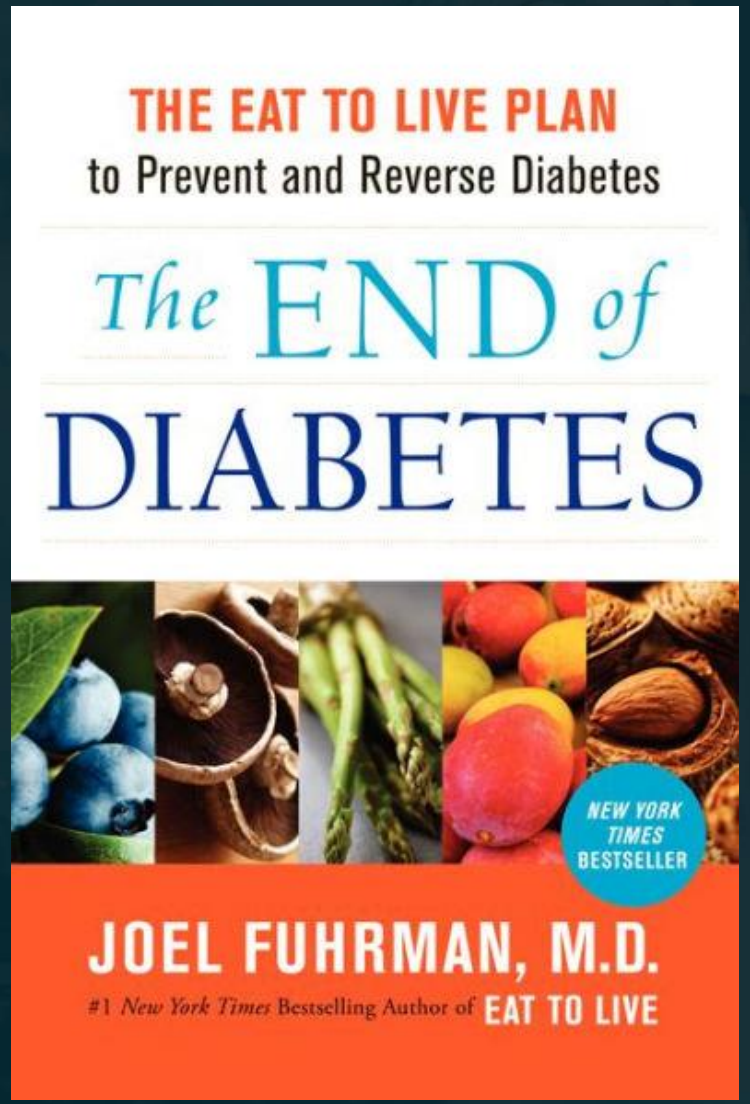

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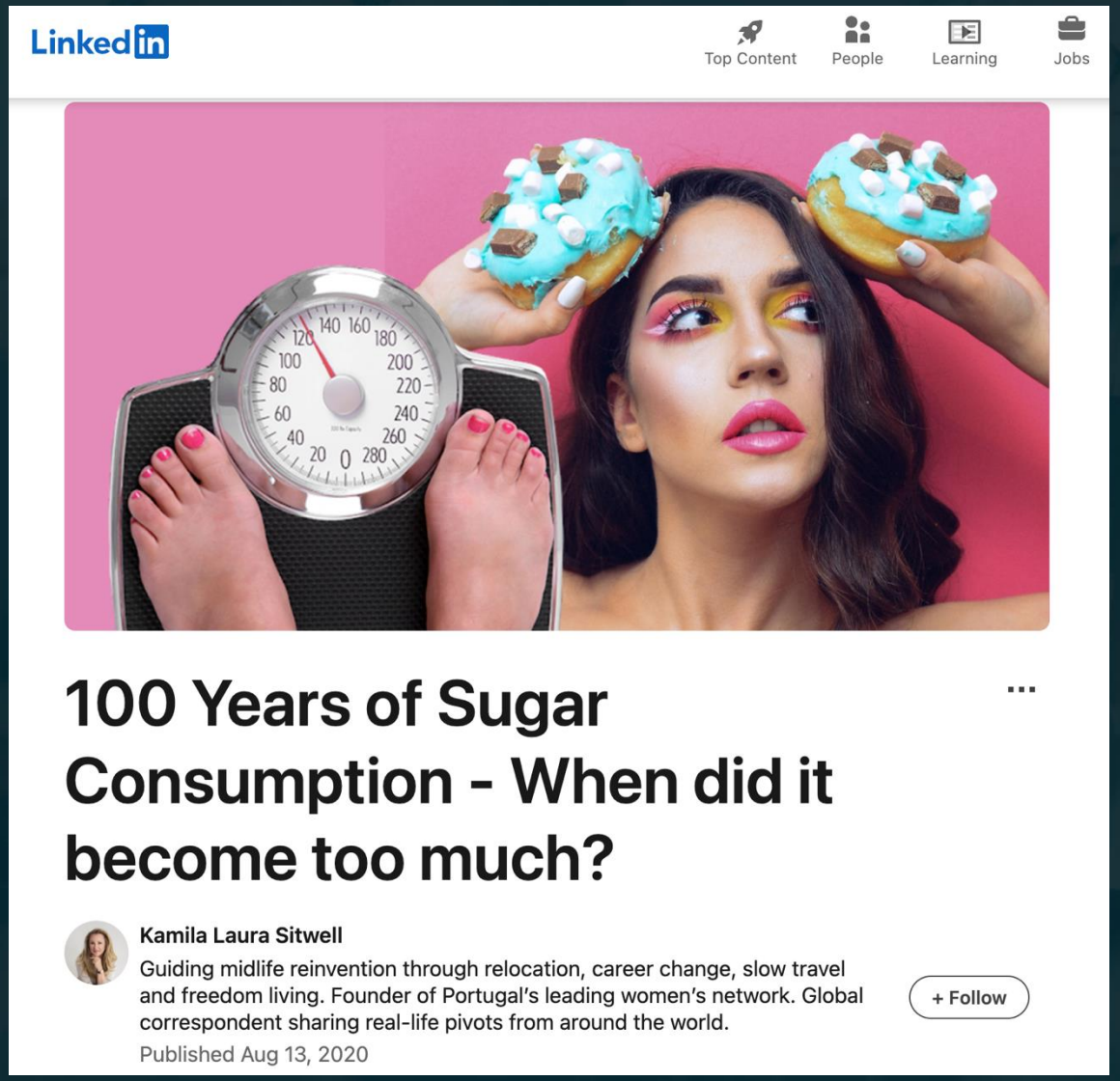

https://www.linkedin.com/pulse/100-years-sugar-consumption-when-did-become-too-much-sitwell

Natural Society conducted research into the average consumption of sugar from 1700 to the present day, and found that:

- In 1700, the average person consumed approximately 4.9 grams of sugar each day (1.81 kg per year).
- In 1800, the average person consumed approximately 22.4 grams of sugar each day (10.2 kg per year).
- In 1900, the average person consumed approximately 112 grams of sugar each day (40.8 kg per year).
- In 2009, 50 per cent of Americans consumed approximately 227 grams of sugar each day - equating to 81.6 kg per year.

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- In 1900, the average person consumed approximately 112 grams of sugar each day (40.8 kg per year). **89.76 Lbs**
- In 2009, 50 per cent of Americans consumed approximately 227 grams of sugar each day – equating to 81.6 kg per year. **179.52 Lbs**

https://www.linkedin.com/pulse/100-years-sugar-consumption-when-did-become-too-much-sitwell

Here's how much sugar is safe per day, according to expert doctors

According to the 2020-2025 Dietary Guidelines for Americans, everyone aged two years and older should keep their added sugar consumption below 10% of their daily calorie intake. For someone following a 2,000-calorie diet, this means no more than 50 grams of added sugar, or approximately 12.5 teaspoons, per day.

The **American Heart Association** says the daily sugar limit is even more conservative.

- Men should aim to consume no more than 36 grams (or nine teaspoons, 150 calories) of added sugar daily.
- Women should aim to consume no more than 25 grams (or six teaspoons, 100 calories) of added sugar daily.

To put this into perspective, a single 12-ounce soda can contain up to 32 grams (eight teaspoons) of added sugar. "If a woman is consuming one of those sodas a day, she's already gone over on her sugar," Tilton says.

https://www.thehealthy.com/nutrition/how-much-sugar-should-you-eat-in-a-day-dietitians/

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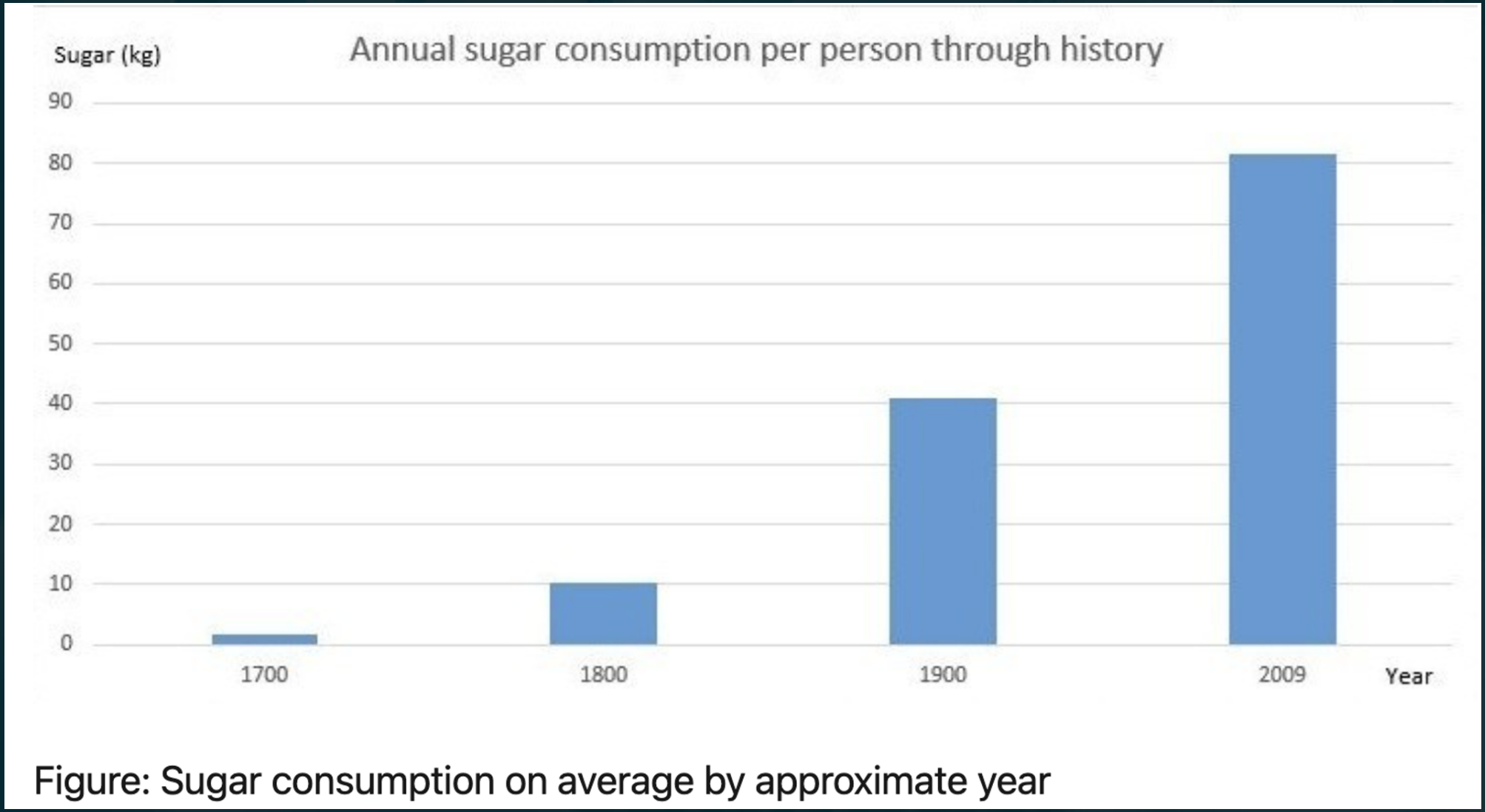

Figure: Sugar consumption on average by approximate year

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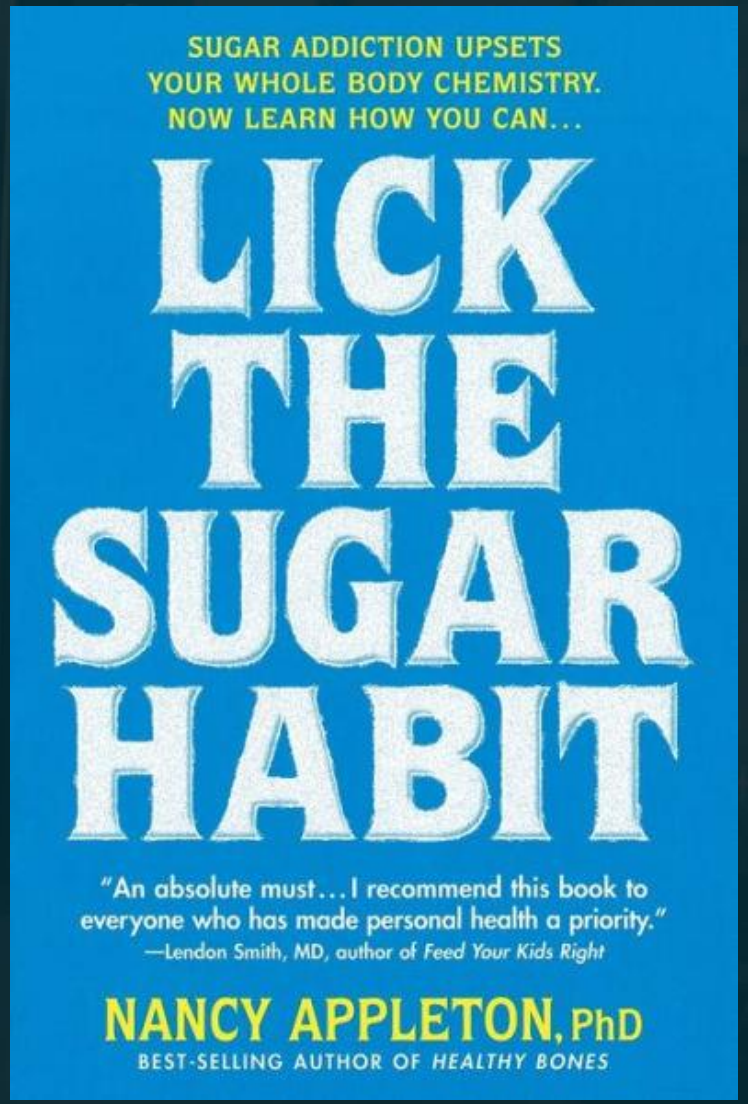
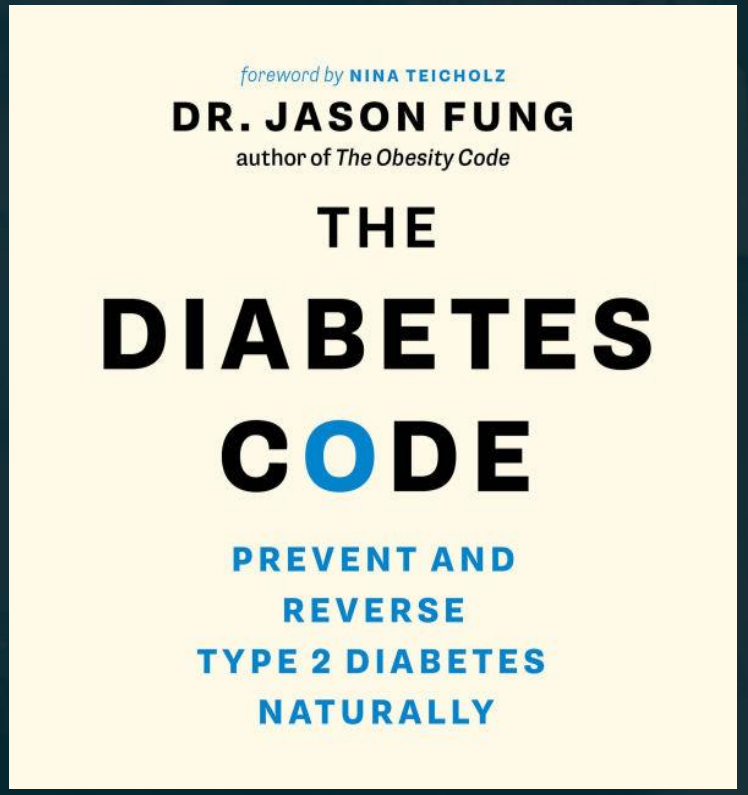
https://www.barnesandnoble.com/w/lick-the-sugar-habit-nancy-appleton/1124829721





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Supplement Facts

Serving Size: 4 Capsules Servings Per Container: 30

Amount Per Serving		% Daily Value
Magnesium (as magnesium citrate, magnesium aspartate, and magnesium malate)	400mg	95%*

*Percent Daily Value (DV) are based on a 2000 calorie diet.
†Daily Value (DV) not established.

OTHER INGREDIENTS: Hydroxypropyl Methylcellulose (Capsule), Vegetable Stearate

Nature Wins Magnesium Complex (120 Count)

Nature Wins SKU: MAGCOMPLEX001--listing

$29.99

★★★★★ (49 reviews) + Write a Review

SIZE: *

1 Bottle $29.99		3.00% 3 Bottles $87.27
4.47% 6 Bottles $170.94		

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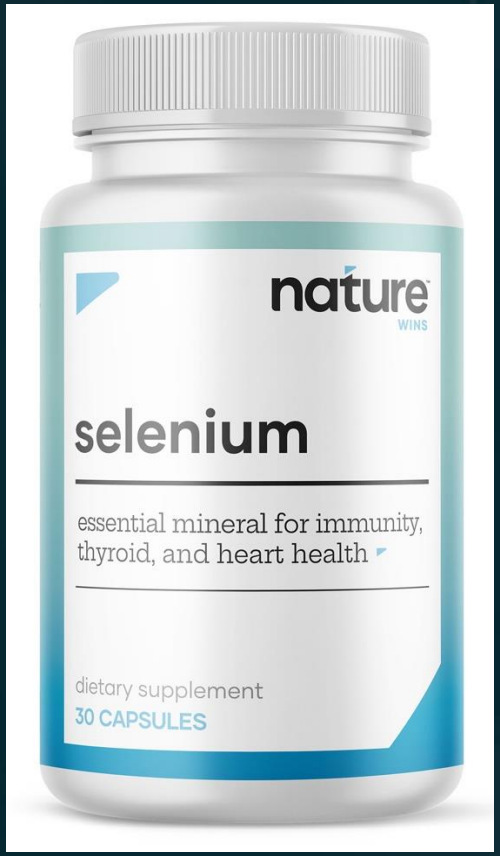

Supplement Facts

Serving Size: 1 Capsule Servings Per Container: 30

Amount Per Serving		% Daily Value
Selenium (as selenomethionine)	200mcg	365%*
Green Pea Powder	200mg	†
Lentil Powder	100mg	†
Millet Flour	100mg	†
Chlorophyll (as sodium copper chlorophyllin)	2mg	†

*Percent Daily Value (DV) are based on a 2000 calorie diet.
†Daily Value (DV) not established.

OTHER INGREDIENTS: Vegetable cellulose (vegetable capsule), rice flour, vegetable stearate.

Nature Wins Selenium (30 Count)

Nature Wins SKU: SELENIUM001--listing

$29.99

★★★★★ (8 reviews) + Write a Review

SIZE: *

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$29.99

3.00%
3 Bottles
$87.27

5.00%
6 Bottles
$170.94

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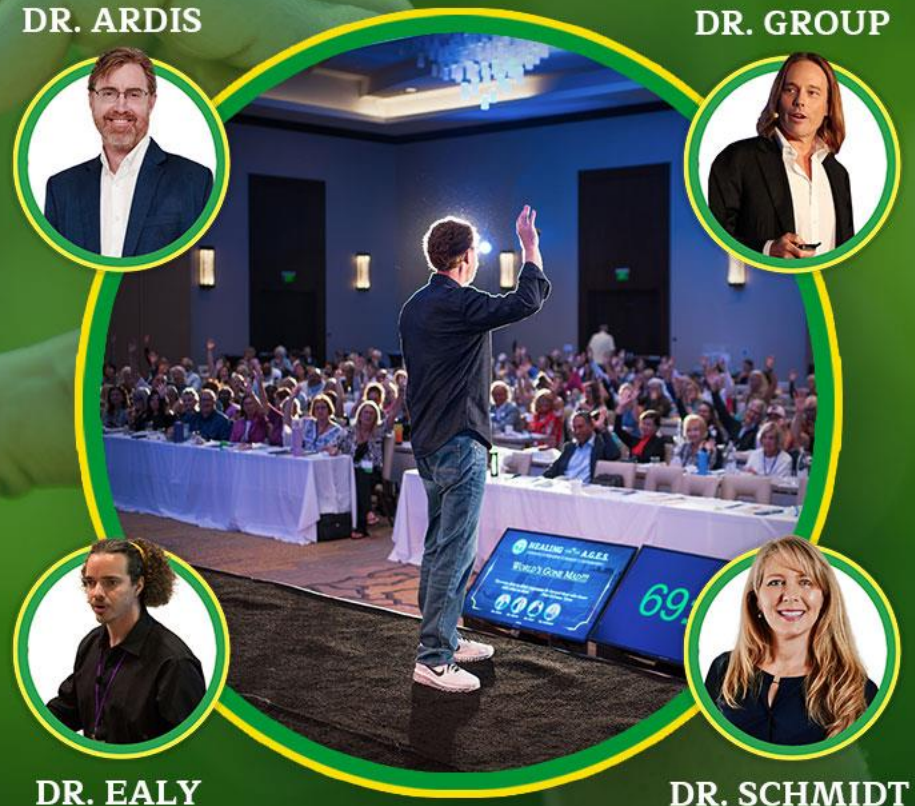

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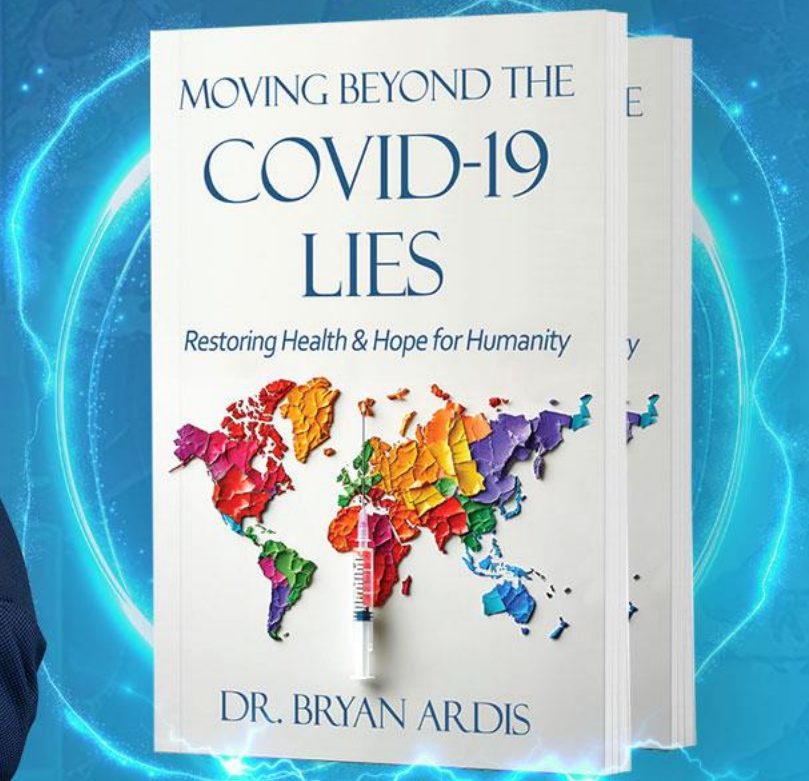

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